Analysis of Traceability and Initial Editorial Response Time in Scientific Journals Based on Open Journal Systems

Irfan Nainggolan, Muhammad Syahputra Novelan, Solly Aryza

Abstract

Open Journal Systems (OJS)-based journal management generates editorial decision metadata that can be used for administrative audits, but not all records provide traceable action-time pairs. This study aims to measure the traceability of the earliest editorial decision observed in OJS exports and analyze the variation in its recording interval across journals. A retrospective audit was conducted of 3,286 submissions from seven journals from March 2023–September 2026. Decision label and decision date pairs were examined to select the earliest valid timestamp that did not predate the submission. Traceability was analyzed using Chi-Square and Cramér's V; the duration distribution in the traced subset was tested using Kruskal–Wallis and a Send to Review-specific sensitivity analysis. A total of 1,494 submissions (45.47%) had an earliest traced decision, with a median interval of 2.68 days. The proportion of traceability differed across journals ($\chi^2(6)=100.38$; $p<0.001$; $V=0.175$), as did the distribution of durations in the traceable subset ($H(6)=107.23$; $p<0.001$). Since 54.53% of records were untraceable and the first decision type was predominantly Send to Review, the duration figures cannot be interpreted as the time of first response to authors or the time of final decision. The study resulted in an audit framework based on explicit extraction criteria to support monitoring the completeness of editorial metadata.

***Keywords**: Open Journal Systems, metadata traceability, first editorial action, data audit, Chi-Square, Kruskal–Wallis.*

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Introduction

Managing a scientific journal involves a series of activities starting from manuscript acceptance, editor assignment, peer review, editing, and article production. In Open Journal Systems (OJS), these stages are supported by a digital workflow with various decisions and communications that have different operational meanings [1], [2]. The resulting data can help managers monitor the implementation of the editorial process, provided that each indicator is built from consistently defined types of events and time markers.

Manuscript handling response time is a relevant aspect for author experience and service transparency. Huisman and Smits [3] and Zabala et al. [4] show that manuscript handling and publication time can vary across journals and disciplines and has several components, including initial review, reviewer assignment, and editorial decision. Therefore, the timestamp for manuscript transition to the review stage should not be equated with the time of the review decision or with the total processing time of the manuscript. Incorrectly defining the start and end events can lead to misleading performance indicators.

On the other hand, not all administrative data are uniformly complete. The absence of metadata may reflect variations in export configurations, system changes, or recording practices, and does not necessarily indicate that the editorial process never took place. Guidelines for reporting observational studies emphasize the importance of describing missing data and the process for selecting units of analysis [5]; more recent missing data reporting frameworks also emphasize examining patterns of incompleteness and their impact on the validity of the analysis [6].

Recent studies on event log quality emphasize that completeness of case identities, activity labels, and timestamps are prerequisites for valid process analysis. Dakic et al. [7] and ter Hofstede et al. [8] show that event data quality issues can alter the results of process analysis. Although the context is not an OJS journal, these principles support the need to examine action–timestamp pairs before calculating editorial duration indicators.

Studies directly related to manuscript management systems have shown that digital activity traces are not identical to the full range of editorial activity. Hartstein and Blümel [9] analyzed process data from editorial management systems and demonstrated the importance of understanding how digital infrastructure represents the stages of editorial work. Krapež [10] examined the need for evaluation and improvement of editorial flows from the perspective of journal editors. More specifically, de Jonge and Kramer [11] found variations in the completeness of publication metadata related to submission systems and their management practices, including OJS. These three sources support the need for auditing the scope of available data, but do not prove that the OJS export timestamps in this study capture all editorial actions.

In the context of administrative data monitoring outside of scientific publishing, Pranoto, Wahyuni, and Novelan [12] developed an integration of data analysis with Apache Superset visualization to support monitoring of local tax receivables. Meanwhile, Hidayati, Aryza, and Novelan [13] formulated an evaluation of IT governance and information system success that included dimensions of information quality in government asset reporting. Both studies were used as conceptual comparisons for the need for data-based monitoring and information governance; neither validated the completeness of timestamps or the OJS editorial decision flow.

The gap addressed by this study is the need to distinguish between two issues often confused in OJS administrative reporting: whether the timing of editorial decisions can be found in export data, and how long the elapsed time is until the earliest decision recorded in a traceable record. This study does not claim to be a comprehensive survey of all OJS audits ever conducted; its specific contributions are the application of explicit operational definitions to seven journals within a single publisher, the reporting of traceability denominations, and sensitivity analysis by action type. Unlike time series forecasting studies, the units of analysis in this study are submission records and event–timestamp pairs. This protocol can be repeated

on exports with similar columnar structures, but its correspondence to OJS activity history still requires independent validation.

Specifically, the study aims to: (1) measure the traceability of the first editorial action recorded in OJS export data; (2) compare the proportion of traceability and the distribution of durations across journals; (3) assess the consistency of results when the analysis is limited to the Send to Review action type; and (4) formulate recommendations for metadata audits and administrative monitoring. The study does not assess the scientific quality of manuscripts, the productivity of individual editors, or journal accreditation outcomes.

Literature Review

2.1 Digital editorial flow and definition of first action

In OJS, the editorial process includes the stages of Submission, Review, Copyediting, and Production [1]. The Send to Review action indicates a move from initial review to review, while Accept Submission, Request Revisions, and Decline Submission have different consequences [2]. Therefore, the study defines the "first recorded editorial action" operationally as the earliest available action type and timestamp pair that does not precede the time of submission, rather than as the first activity that actually occurs in the system. This definition is limited to information that can be extracted from CSV reports.

2.2 Traceability and quality of metadata

Lee et al.'s [6] incomplete data reporting framework emphasizes documentation of incompleteness patterns, analysis assumptions, and sensitivity checks. Rule et al.'s [14] guidance also emphasizes the importance of explicitly explaining metadata sources, measurement definitions, and time indicator denominators. Both studies come from observational data and digital systems contexts that differ from OJS; their application here is an adaptation of the transparency principle, not proof that the causes of OJS incompleteness are known.

Traceability is the ability to link a record to evidence of an event and its timestamp. In this study, traceability values are binary: the presence or absence of an action–timestamp pair that meets the extraction criteria. Untraceable values are not interpreted as editor failures, as an action may have been performed but not represented in the examined export column. Reporting the proportion of missing data and analysis selection limits is important to avoid interpretation bias in administrative data [5], [6].

2.3 Testing of traceability and duration distribution

The Chi-Square test measures the association between two categorical variables, while Cramér's V complements the significance results with a measure of the strength of association [15]. For right-skewed durations, Kruskal–Wallis is used to compare rank-based distributions between more than two groups [16]. If exploratory comparisons between pairs are needed, the Mann–Whitney test can be applied with a Holm adjustment to control for multiple testing error [17], [18]. Statistical significance does not prove a causal relationship or a difference in the quality of editorial work.

Research Methodology

3.1 Design, data sources, and unit of analysis

This study is a quantitative retrospective audit of administrative data from seven journals from a single publisher: JASMlEN, JUDGE, INSTAL, JATILIMA, JUMAS, IEM, and BENIH. The data source was seven OJS export CSV files dated November 1, 2026, containing 3,892 records. A total of 3,715 records had a legible submission date; after applying the period of March 1, 2023–September 30, 2026, 3,286 records were analyzed. Therefore, 177 records were excluded due to illegible submission dates, and 429 records had valid dates outside the study period. The unit of analysis was a single submission record, not a single unique article or a single editor. The personal identities of authors and reviewers were not used in the data analysis.

3.2 Extraction of the time of the first editorial action

The Date submitted column is used as the starting time (t_0). For each record, all pairs of the Editor Decision n (Editor k) and Date decided n (Editor k) columns in the CSV are examined. Column names are matched based on label patterns with a tolerance for spacing. Pairs are accepted if the action label is filled in, the decision date is parsable, and the decision time does not precede the submission time. Of the pairs that meet the criteria, the earliest timestamp is selected as t_1. If no valid pair is found, the record is declared untracked in the export. The term "first action" in this study refers to the earliest editorial decision in the examined export column, not the earliest editor activity in the entire OJS history. Editor assignments or internal communications may have occurred earlier without being reflected in these columns.

$$\text{Time interval (days)} = (t_1 - t_0) / 86{,}400 \text{ seconds.}$$

Time intervals were calculated only on tracked records. Date parsing was performed computationally on the date values in the CSV; the resulting durations followed the time representation in the export file. Last modified date, publication date, and final manuscript status were not used as substitutes for t_1. Inspection of the extraction results categorized 1,792 untracked records as records without a completed decision label in any of the examined field pairs. This category reflects the content of the export, not evidence of the absence of editorial activity in the system. Because the source time zone and OJS activity history have not been independently verified, the resulting time remains treated as an export-based administrative indicator.

3.3 Variables, statistical testing, and sensitivity analysis

The main variables include journal of origin (seven categories), traceability indicator (0/1), earliest decision interval in days, submission year, and the first observed action type label. The traceability proportion is calculated as the number of traceable records divided by all submissions in the analysis period, while the duration summary uses the median, Q1, Q3, and P90 specific to the traceable subset. The association of journal with traceability was evaluated using Chi-Square in a 7×2 table and Cramér's V effect size. Differences in duration distributions across the seven groups were tested using Kruskal–Wallis, with an epsilon-squared effect size. A p value <0.05 was used as the significance threshold; very small p values were recorded as $p < 0.001$. These between-group tests are unadjusted: year composition, editorial status, and record age at export may differ, so associations should not be interpreted as causal effects or quality of editorial service.

A sensitivity analysis was repeated using the Kruskal–Wallis method on records with the earliest decision label Send to Review. A two-sided Mann–Whitney U test with an asymptotic approach was performed on 21 journal pairs in the tracked subset, and p-values were adjusted using the Holm procedure. The analysis was run in Google Colab using Python, pandas, SciPy, and statsmodels. The recalculation results are presented in an aggregate table and a 21-pair table; time estimates are based on timestamps successfully read from the export data, so the accuracy of the measurements remains dependent on the source time format.

Results

4.1 Completeness of traceability in OJS data

Of the 3,286 submissions that met the research range, 1,494 records (45.47%) had a first editorial action with a valid date that did not precede the submission. The remaining 1,792 records (54.53%) did not have an action–timestamp pair that met this definition in the export file. All 1,494 traceable records were used in the time-lapse analysis. The proportion of traceability by journal is shown in Table 1 and Figure 1.

The data selection process consisted of 3,892 initial records, 3,715 records with a readable submission date, and 3,286 records within the study period. A total of 177 records did not have a readable submission date, and 429 records were outside the observation range. For the 1,792

untracked records, the extraction column audit did not find any editorial decision labels filled in. The absence of labels in the CSV should not be equated with the absence of editorial activity in the OJS history.

Table 1. First action traceability and median duration per journal

Journal	Number of manuscripts	Tracked	Coverage (%)	Median (days)	Q1–Q3
JASMILEN	719	307	42.70	2.94	0.78–9.33
JUDGE	889	471	52.98	1.43	0.56–6.03
INSTALL	483	204	42.24	4.30	0.28–11.54
JATILIMA	376	208	55.32	3.92	0.94–28.25
FRIDAY	340	108	31.76	1.59	0.43–7.91
IEM	324	104	32.10	14.99	6.98–30.45
SEED	155	92	59.35	1.51	0.55–22.00
TOTAL	3,286	1,494	45.47	2.68	0.63–11.31

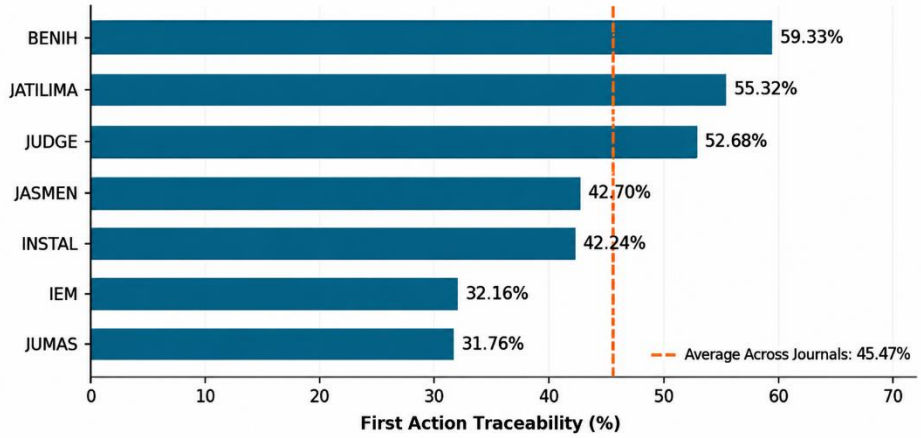


Figure 1. Percentage of traceability of first editorial action by journal.

Traceability coverage varied from 31.76% (JUMAS) and 32.10% (IEM) to 59.35% (BENIH). Chi-Square results showed an association between journal of origin and traceability ($\chi^2(6)=100.38$; $p<0.001$). The magnitude of the association according to Cramér's V was 0.175. The minimum expected value in the contingency table was 70.47, so there were no cells with very small expectations. The sample size can produce very low p values even though the association is not strong; therefore, the effect size and proportion variation still need to be reported.

Traceability coverage varies by submission year and journal. These differences may be related to export configuration, filing practices, manuscript status, and the length of follow-up to the export date. The chi-square test in this study is an association analysis without adjustment for these factors; therefore, differences between groups should not be interpreted as changes in editorial behavior or quality.

Incompleteness also varied across the period: the proportion tracked in 2023 was 43.48% (80 of 184), 2024 was 36.79% (309 of 840), 2025 was 37.33% (467 of 1,251), and January–September 2026 was 63.11% (638 of 1,011). Variation by year suggests that differences between groups cannot be automatically assumed to reflect uniform editorial behavior over time. This analysis does not adjust for journal associations with year composition and manuscript status.

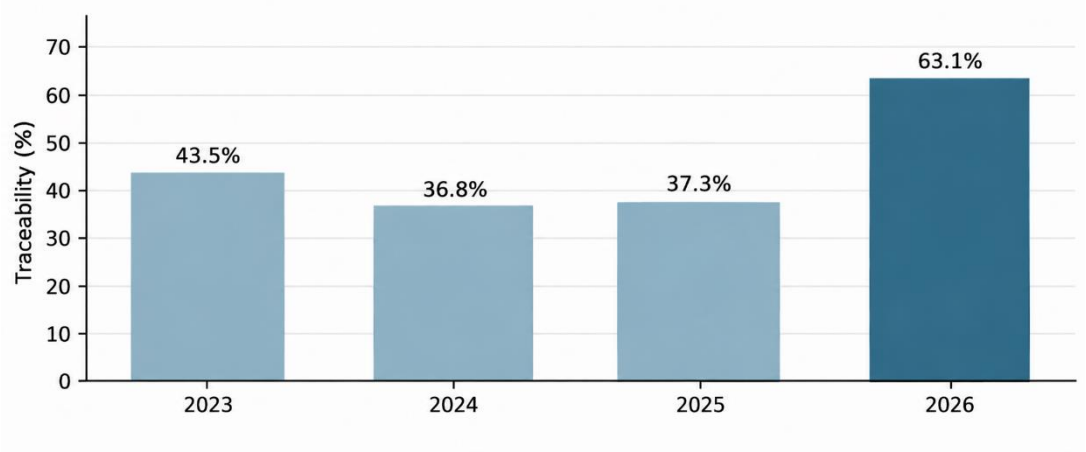


Figure 2. Traceability percentage by submission year (2026 to September)

Specifically, the proportion of actions within one or seven days is a conditional percentage of the 1,494 records with valid timestamps, not a measure of the percentage of all submissions that actually received a response within that timeframe. Because the incompleteness mechanism may be related to the journal or editorial stage, the median on the tracked subset risks not being representative of all submissions.

4.2 Distribution of first action interval

Among the records with tracked timestamps, the median first action interval was 2.68 days, with Q1=0.63 days, Q3=11.31 days, and P90=33.19 days. Thirty-five percent of tracked records recorded the first action within one day, while 69.54 percent recorded the first action within seven days. These percentages were not calculated for all 3,286 records, as the action time was unknown for more than half of them.

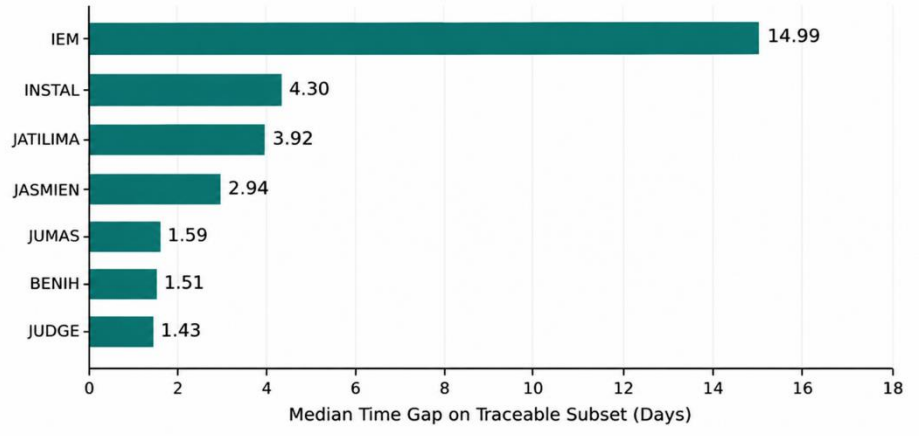


Figure 3. Median duration of first editorial action on tracked subset.

The median per journal varied from 1.43 days in JUDGE to 14.99 days in IEM. Recalculation of the 1,494 tracked records yielded a Kruskal–Wallis $H(6)=107.23$ ($p<0.001$) and an epsilon-squared ≈ 0.068. Thus, the observed distributions of administrative durations differ across journals. However, these results were obtained on the subset with valid timestamps; differences in scope, submission period, and action labels may affect the compared distributions.

4.3 Types of actions and sensitivity checks

Table 2. Distribution of first action labels on tracked records

Type of action	Amount	Proportion (%)
Send to Review	1276	85.41
Accept Submission	105	7.03
Decline Submission	64	4.28
Send To Production	20	1.34
Recommendation (various types)	19	1.27
Request Revisions	10	0.67
TOTAL	1,494	100.00

The Send to Review action dominates with 1,276 records (85.41%), so the resulting time indicator is essentially closer to the initial time of the move to the review stage than the time of the review decision received by the author. In a sensitivity analysis that only includes Send to Review (n=1,276), the Kruskal–Wallis results still show differences in distribution between journals: $H(6)=73.44$; $p<0.001$; epsilon-squared around 0.053. This finding reduces some of the heterogeneity due to different types of actions, but does not eliminate the possibility of timestamp selection bias and other unaccounted factors.

Further Mann–Whitney U tests were calculated for all 21 journal pairs using submission-level duration data (n=1,494). After Holm's adjustment for the 21 tests, 10 pairs showed significant differences in duration distributions (corrected p-value <0.05), while the remaining 11 pairs were insignificant. Details of the U, original p-value, and corrected p-value are presented in Table 4. These results are exploratory and do not indicate the causes of the differences or the editorial quality rankings.

Table 3. Summary of statistical testing and interpretation

Testing	Statistics	p	Effect size
Chi-Square traceability vs journal	$\chi^2(6) = 100.38$	<0.001	$V = 0.175$
Kruskal-Wallis all actions are tracked	$H(6) = 107.23$	<0.001	$\varepsilon^2 \approx 0.068$
Kruskal-Wallis: Send to Review	$H(6) = 73.44$	<0.001	$\varepsilon^2 \approx 0.053$

Operationally, the proposed audit protocol consists of the following sequence: defining the submission unit and period, inventorying label–timestamp column pairs, applying completeness and time-order validation, selecting the earliest valid decision, classifying traceability, and then reporting the proportion of traced data before calculating the duration distribution. This sequence prevents velocity indicators from being reported without addressing the underlying data coverage. The demonstrated contribution is the protocol's application to the export of seven journals; accuracy to OJS history and portability to other OJS configurations have not been tested.

In the pairwise analysis, IEM differed significantly from six other journals (JUDGE, JASMlEN, JUMAS, INSTAL, BENIH, and JATILIMA) after Holm's correction. The other four significant pairs were JATILIMA–JUDGE, JATILIMA–JUMAS, JASMlEN–JUDGE, and BENIH–JATILIMA. Despite the differences in distribution, this test only includes records with traceable timestamps and does not adjust for year composition, manuscript status, or incomplete data. Therefore, the results cannot be used to rank journal performance or quality.

Table 4. Complete Mann–Whitney U results for 21 journal pairs with Holm correction (α=0.05)

Journal pair	U	initial p	p Holm	Decision
IEM–JUDGE	39657	4.62e-23	9.70e-22	Significant
IEM–JASMIEN	23263.5	3.13e-12	6.25e-11	Significant
IEM–JUMAS	8711	4.19e-12	7.97e-11	Significant
IEM–INSTALL	15567	1.97e-11	3.54e-10	Significant
SEED–IEM	2621	4.86e-8	8.26e-7	Significant
JATILIMA–JUDGE	61797	5.39e-8	8.63e-7	Significant
JATILIMA–JUMAS	14413	3.65e-5	5.47e-4	Significant
IEM–JATILIMA	13668.5	1.47e-4	0.0021	Significant
JASMIEN–JUDGE	82469	9.02e-4	0.0117	Significant
SEEDS–JATILIMA	7457	0.0023	0.0278	Significant
JASMIEN–JATILIMA	27391.5	0.0062	0.0681	No
INSTALL–JATILIMA	18057	0.009	0.0896	No
JASMIEN–JUMAS	19048	0.0212	0.1912	No
INSTALL–JUDGE	52571.5	0.0516	0.4126	No
SEED–INSTALL	9176	0.7608	1	No
SEEDS–JASMIEN	13118	0.301	1	No
INSTALL–JUMAS	11958	0.2142	1	No
INSTALL–JASMIEN	30337.5	0.5505	1	No
SEEDS–JUMAS	5302	0.4136	1	No
SEED–JUDGE	23014.5	0.3449	1	No
JUDGE–JUMAS	25205.5	0.8844	1	No

Source: Results of processing OJS export data (2026).

Description: Two-tailed Mann–Whitney U test with Holm correction (α = 0.05). Significant if p-corrected < 0.05.

4.4 Discussion, contributions, and operational implications

These results suggest that interpretation of duration should begin with an examination of traceability coverage. Although some journal pairs have significantly different duration distributions, 54.53% of records in the analysis period do not provide decision labels in the examined columns. Therefore, medians and duration comparisons only reflect an observed subset, not the entire editorial service process. Administrative monitoring should present traceability proportions alongside time summaries to clearly define the limitations of the analysis denominations.

The contribution of this study is not the creation of a new algorithm, but rather a scalable audit protocol based on event type and timestamp pairs, the separation of traceability indicators from duration, association testing for completeness per journal, and sensitivity checks on homogeneous action types. This approach differs from research that measures the duration of final peer review decisions [3]; "Send to Review" in OJS marks a stage transition [2], not the outcome of peer review. Therefore, the median of 2.68 days cannot be interpreted as first decision time in the international publisher sense. The emphasis on traceable process traces is also in line with studies of editorial management systems [9] and studies of metadata completeness in submission systems, including OJS [11]. Both serve as conceptual comparisons, not validation evidence for this research record. The study of evaluation and publication delays by Zabala et al. [4] also demonstrates why the definition of the start and end points of time measurement needs to be distinguished from the first decision indicator used here.

The practical implications of this audit can be related to a limited extent to the research on business intelligence-based administrative monitoring by Pranoto et al. [12], namely the importance of preparing indicators that can be displayed and reviewed by managers. The study on governance and information quality by Hidayati et al. [13] provides context that information

system assessments need to pay attention to the quality of the information used. However, these articles use different objects, data, and methods; therefore, they are not empirical justification for the traceability or duration values of OJS obtained in this study.

Post-hoc results indicate that differences in duration distributions predominantly involve IEM journals. This is consistent with the higher median IEM in the tracked subset, but is insufficient to conclude editorial lag, as 67.90% of IEM records lack a traceable decision-timestamp pair in the export. Differences in recording mechanisms, year composition, and decision types should be examined before using these results to establish service targets.

The implementation of administrative indicators also requires consistent process governance and operational documentation. Lubis et al. [19] demonstrated the application of ITIL V3 to formulate service procedures and design SLAs in a library system. Damanik, Sitorus, and Khairul [20] developed a fieldwork reporting system that emphasized activity recording, task management, and progress monitoring. Meanwhile, Putra, Wijaya, and Khairul [21] evaluated IT governance using COBIT 2019 and recommended post-change quantitative metrics. All three studies support the general need for standards for recording, monitoring, and governance of digital services. Because the objects were not OJS, they were not used as evidence for the completeness of timestamps or the differences in editorial durations found in this study.

This study uses the same institutional sources used in the submission volume forecasting study, but the questions, units of analysis, and outputs are different. The forecasting study focused on the number of submissions per month and evaluated SARIMA, Prophet, and XGBoost, while this study assessed event–timestamp pairs at the record level and tested for variations in traceability and duration. The different purposes and use of the same data sources need to be transparently disclosed according to publication guidelines [22].

4.5 Research limitations

The study's limitations include several aspects. First, 54.53% of records lacked a decision label in the examined export column, and the operational reason for this could not be ascertained from the system history. Second, the earliest decision in the CSV does not always represent the first editorial activity to occur. Third, the source format and time zone, the possibility of duplicate submissions, and differences in export configurations between journals have not been independently verified. Fourth, the intergroup testing did not adjust for year composition, manuscript status, or observation duration. Fifth, the analyzed metadata does not provide evidence of the timing of decision communication to authors or the length of reviewer review. Therefore, the study's results cannot be used to draw causal conclusions, assess individual editor performance, or rank journal quality.

Conclusion

A retrospective audit of 3,286 submissions from seven OJS-based journals yielded 1,494 records (45.47%) with valid editorial decision and timestamp pairs in the export data, while 1,792 records (54.53%) did not have decision labels in the examined columns. The median administrative duration in the tracked subset was 2.68 days. A chi-square test indicated an association between journal and traceability ($\chi^2(6)=100.38$; $p<0.001$; $V=0.175$), while a Kruskal–Wallis test revealed a difference in duration distributions ($H(6)=107.23$; $p<0.001$), including in the Send to Review subset ($H(6)=73.44$; $p<0.001$). Of the 21 Mann–Whitney U comparisons, 10 pairs were significant after Holm correction. The findings support administrative monitoring that reports traceability alongside duration, but does not measure final decision time or editor quality. Operational generalizations and interpretations are limited by the scope of export data and the lack of independent verification of OJS history.

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